# ASTRONOMICAL SOCIETY OF LONDON.

*March* 9, 1827. No. 2.

At this meeting there was read, a "Notice respecting some errors common to many tables of logarithms," by Charles Babbage, Esq., Foreign Secretary of this Society. Mr. Babbage having lately printed a stereotype table of the logarithms of the natural numbers, for the use of the Trigonometrical Survey in Ireland, for the sake of greater accuracy subjected them to eight readings and comparisons with other tables. This cautious process led to the detection of various errors, which are common to almost all the tables; those of Vega, the last impressions of Callet, and Mr. Babbage's own tables, being all that he has found free from the errors which he specifies. The tables subjected to this examination were those of Vlacq, Gouda, 1628, carried to ten figures; Vlacq, London, 1633; Wingate, London, 1633; Newton, in his *Trig. Britan.* 1658, to eight figures; Sherwin, London, 1726; 2nd ed. 1741; 3rd ed. 1742; Gardiner, London, 1742; Sherwin, 4th ed. 1761; 5th ed. 1770; Gardiner, Avignon, 1770; Schulze, Berlin, 1778; Gardiner, Furenze, 1782; Taylor, London, 1792; Vega, Leipsic, 1794; Callet, (stereotype,) Paris, 1795; Callet, ditto, Paris, (tirage,) 1825; Hobert and Ideler, Berlin, 1799; Delambre, Tab. Dec. Paris, 1801; Hutton, 4th ed. London, 1804; 5th ed. 1811; Vega, Leipsic, 1820; Hutton, 6th ed., London, 1822; Babbage, London, 1827.—Mr. Babbage thinks that the errors which he has detected can only be attributed to the universal system of copying which prevails in such works.

The numbers and *correct* logarithms to *seven* places are as below:

| Numbers. | Logarithms. | Vlacq's last five figures. |
|---|---|---|
| 24626 ..... | 3913940 ..... | 39751 |
| 38962 ..... | 5906412 ..... | 13420 |
| 57628 ..... | 7606335 ..... | 35875 |
| 57629 ..... | 7606411 ..... | 10436 |
| 63747 ..... | 8044598 ..... | 97412 |
| 67951 ..... | 8321959 ..... | 58424 |

From these the several tables specified may readily be corrected.

Mr. Babbage knowing that there was in the Library of the Royal Society a table of logarithms printed in the Chinese character, and which exhibits no indication or acknowledgment of its being copied from another work, was naturally desirous to compare it with European tables. On doing so, he found that in the *six* cases above noted, errors occurred precisely as in the European tables; thus furnishing an irresistible proof that the Chinese tables have an European origin.

There were next read two letters from Mr. Andrew Lang to F. Baily, Esq.: one dated St. Croix, 20th of March, 1826; the

other, St. Croix, 13th November, 1826. The first of these transmits an account of observations of the meridian transit of the moon's enlightened limb, and some stars preceding and following her, made at St. Croix, lat. 17° 44′ 32″ north, assumed long. 64° 45′ west, between September 22, 1825, and March 15, 1826. These were sent to Mr. Schumacher at the same time, and have been published in No. 104 of his *Astron. Nachrichten.*

Mr. Lang describes the climate of St. Croix as peculiarly favourable to astronomical observations, and speaks of the steadiness of the terrestrial refraction there. The terrestrial refraction scarcely ever varies perceptibly from the *one-sixteenth* part of the intercepted arc.

In Mr. Lang's second communication he presents a further account of the meridian transits of the moon's enlightened limb, and of moon-culminating stars, observed between March 30, and November 21, 1826. He also gives a summary of his observations of occultations of $\mu^1$, and $\mu^2$, *Sagittarii* by the moon, on the 9th of September; and of $\psi$ *Virginis*, on the 28th of October.

Next, there was read a paper, "On a new application of the method of determining the time by observations of two stars when in the same vertical, to the case of *Polaris* when so situated with respect to any other circumpolar star in the course of its diurnal revolution below the pole: by Dr. T. L. Tiarks." The author first describes the peculiarities and advantages of this method, and then presents the investigation of the formulæ of computation. If $l$ denote the co-latitude of the place of observation, $d$ the polar distance of the pole-star, D that of the other star, $\alpha$ their difference of right ascensions, and $t$ the time elapsed from the upper passage of the pole-star to the moment of its being on the same vertical with the other; then the result of the investigation gives

$$\text{(I)} \ldots\ldots \sin(t + \varphi) = \frac{\sin \alpha}{\gamma \tan l}.$$

The values of $\gamma$ and $\varphi$ being determined by the following equations: viz.

$$\text{(II)} \ldots\ldots\ldots \gamma = \frac{(\sin \mathrm{D} - d)}{\sin d \sin \mathrm{D} \cos \psi}.$$

$$\text{(III)} \ldots\ldots \tan \psi = \frac{\sin \frac{1}{2} \alpha \sqrt{(\sin 2\,\mathrm{D} \sin 2\,d)}}{\sin (\mathrm{D} - d)}.$$

$$\text{(IV)} \ldots\ldots \sin \varphi = \frac{\sin \alpha}{\gamma \tan d}.$$

The author occupies a portion of his paper in tracing the limits of error, and in pointing out in what cases the method is not strictly true.

Lastly: There was read a letter from M. Gambart to the President, dated Marseilles, 30th of December, 1826. After adverting to what may be supposed his temerity in anticipating the transit of the comet seen in Boötes over the sun's disc, on the 18th of November, he presents the elements of the parabolic orbit of another comet, which are as below: viz.

| | | |
|---|---|---|
| Passage of the perihelion 1827. | 34$^{d}$·989 | M.T. from midn$^{t}$. |
| Perihelion distance ..... | 0·455 | |
| Longitude of perihelion ..... | 34° 0′ 50″ | |
| Longitude of the node ..... | 191 44 33 | |
| Inclination ..... | 72 4 15 | |

Motion retrograde.

M. Gambart exhibits a comparison of the results of these elements, and of his observations on the 27th, 28th, and 29th of December.

The President read part of a private letter from M. Littrow, Director of the Imperial Observatory at Vienna, stating that his Majesty the Emperor of Austria has liberally authorised the purchase, for that observatory, of a refractor, similar in all respects to that made by Fraunhofer for the Observatory at Dorpat, and which, at the death of that excellent artist, was left (so he understood the words "*des noch übrigen*") by him amongst his other instruments undisposed of.

J. Moyes, Castle Street, Leicester Square.